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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/624,357	07/21/2003	Aaron Scott Lukas	06381P USA	7231

23543 7590 11/27/2006

AIR PRODUCTS AND CHEMICALS, INC.
PATENT DEPARTMENT
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EXAMINER

RODGERS, COLLEEN E

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 11/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/624,357	LUKAS ET AL.	
	Examiner	Art Unit	
	Colleen E. Rodgers	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 30,31 and 38-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 30,31 and 38-47 is/are rejected.
- 7) ☒ Claim(s) 38 and 43 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of a hydrocarbon species, specifically alpha-terpinene in the reply filed on 8 September 2006 is acknowledged. The traversal is on the ground(s) that no burden to the examiner exists in examination of the Markush group. This is found persuasive. The claims will be examined in their entirety. Claims 30, 31 and 38-47 are pending.

Claim Objections

2. Claims 38 and 43 are objected to because of the following informalities: in both claims, remove one of the duplicate instances of the hydrocarbon species camphene. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 30, 31, 38 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mandal** (US Patent Application Publication 2002/0142585) in view of the article by **Waldfried et al**, "Single Wafer RapidCuring™ of Porous Low-k Materials," *IEEE*, 2002, pp. 226-228, and **Li et al** (US Patent Application Publication 2003/0151031).

Regarding claim 30, **Mandal** discloses a mixture for depositing an organosilicate film comprising a dielectric constant of 3.5 or less, the mixture comprising at least one structure-former precursor selected from the group consisting of an organosilane and an organosiloxane [see paragraphs 0032, 0033], and a pore-former precursor [see paragraph 0036].

Mandal does not disclose wherein said film exhibits an absorbance of 200 to 400 nm wavelength. **Mandal** would look to one such as **Waldfried et al** for a porous low-k film, because **Waldfried et al** disclose wherein a film formed thus would exhibit an absorbance in the 200 to 400 nm wavelength range. It would have been obvious to one of ordinary skill in the art at the time of invention to modify **Mandal** by using the mixture of **Waldfried et al** because **Waldfried et al** disclose improved low-k material properties, and reduced process times and process temperatures [see **Waldfried et al**, Abstract].

Furthermore, **Mandal** discloses pore-forming compounds such as 2,4,6-trisilaoxane or cyclo-1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene, and not pore-forming compounds comprising one or more of a hydrocarbon compound, a decomposable polymer or a polyoxyalkene. **Li et al** disclose a mixture for depositing an organosilicate film with a dielectric constant lower than 3 [see paragraph 0005], which is formed by the inclusion of a pore-former precursor, or poragen, wherein the poragen may be a hydrocarbon, including adamantane, as further limited by claim 38 [see paragraph 0136]. It would have been obvious to use the poragen disclosed by **Li et al** in the mixture of **Mandal** because **Li et al** discloses that adamantane is one of several art-recognized useful poragen materials.

Regarding claim 31, **Mandal** discloses a mixture for depositing an organosilicate film, the mixture comprising: from 5 to 95% by weight of a structure-former precursor selected from the

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group consisting of an organosilane and an organosiloxane and from 5 to 95% by weight of a pore-former compound [see paragraphs 0029, 0032, 0033; paragraph 0036 and paragraphs 0044-0046].

Mandal does not disclose wherein said film exhibits an absorbance of 200 to 400 nm wavelength. **Mandal** would look to one such as **Waldfried et al** for a porous low-k film, because **Waldfried et al** disclose wherein a film formed thus would exhibit an absorbance in the 200 to 400 nm wavelength range. It would have been obvious to one of ordinary skill in the art at the time of invention to modify **Mandal** by using the mixture of **Waldfried et al** because **Waldfried et al** disclose improved low-k material properties, and reduced process times and process temperatures [see **Waldfried et al**, Abstract].

Furthermore, **Mandal** discloses pore-forming compounds such as 2,4,6-trisilaoxane or cyclo-1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene, and not pore-forming compounds comprising one or more of a hydrocarbon compound, a decomposable polymer or a polyoxyalkene. **Li et al** disclose a mixture for depositing an organosilicate film with a dielectric constant lower than 3 [see paragraph 0005], which is formed by the inclusion of a pore-former precursor, or poragen, wherein the poragen may be a hydrocarbon, including adamantane, as further limited by claim 38 [see paragraph 0136]. It would have been obvious to use the poragen disclosed by **Li et al** in the mixture of **Mandal** because **Li et al** discloses that adamantane is one of several art-recognized useful poragen materials.

5. Claims 30, 31, 39-42 and 44-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mandal** (US Patent Application Publication 2002/0142585) in view of the article by **Waldfried et al**, "Single Wafer RapidCuring™ of Porous Low-k Materials," *IEEE*, 2002, pp. 226-228, and **Lin et al** (USPN 7,041,748).

Regarding claim 30, **Mandal** discloses a mixture for depositing an organosilicate film comprising a dielectric constant of 3.5 or less, the mixture comprising at least one structure-former precursor selected from the group consisting of an organosilane and an organosiloxane [see paragraphs 0032, 0033], and a pore-former precursor [see paragraph 0036].

Mandal does not disclose wherein said film exhibits an absorbance of 200 to 400 nm wavelength. **Mandal** would look to one such as **Waldfried et al** for a porous low-k film, because **Waldfried et al** disclose wherein a film formed thus would exhibit an absorbance in the 200 to 400 nm wavelength range. It would have been obvious to one of ordinary skill in the art at the time of invention to modify **Mandal** by using the mixture of **Waldfried et al** because **Waldfried et al** disclose improved low-k material properties, and reduced process times and process temperatures [see **Waldfried et al**, Abstract].

Furthermore, **Mandal** discloses pore-forming compounds such as 2,4,6-trisilaoxane or cyclo-1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene, and not pore-forming compounds comprising one or more of a hydrocarbon compound, a decomposable polymer or a polyoxyalkene. **Lin et al** disclose a mixture for depositing an organosilicate film with a dielectric constant lower than 3 [see paragraph 0005], which is formed by the inclusion of a pore-former precursor, or poragen, wherein the poragen may be a decomposable polymer, specifically wherein the decomposable polymer is decomposed by radiation, as further limited by claim 39 [see col. 3, lines 54-57]. It would have been obvious to one of ordinary skill in the art at the time of invention to use the poragen disclosed by **Lin et al** in the mixture of **Mandal** because **Lin et al** discloses that decomposable polymers beneficially may be extracted without severely degrading the pattern fidelity [see col. 3, lines 63-66].

Regarding claims 40-42, the prior art of **Mandal**, **Waldfried et al** and **Lin et al** disclose the mixture of claim 39 as described above. Furthermore, **Lin et al** disclose wherein the decomposable

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polymer is a block copolymer [see col. 20, lines 3-6], specifically copolymers or star-shaped polymers, or dendrimeric polymers [see col. 3, lines 58-63].

Regarding claim 31, **Mandal** discloses a mixture for depositing an organosilicate film, the mixture comprising: from 5 to 95% by weight of a structure-former precursor selected from the group consisting of an organosilane and an organosiloxane and from 5 to 95% by weight of a pore-former compound [see paragraphs 0029, 0032, 0033; paragraph 0036 and paragraphs 0044-0046].

Mandal does not disclose wherein said film exhibits an absorbance of 200 to 400 nm wavelength. **Mandal** would look to one such as **Waldfried et al** for a porous low-k film, because **Waldfried et al** disclose wherein a film formed thus would exhibit an absorbance in the 200 to 400 nm wavelength range. It would have been obvious to one of ordinary skill in the art at the time of invention to modify **Mandal** by using the mixture of **Waldfried et al** because **Waldfried et al** disclose improved low-k material properties, and reduced process times and process temperatures [see **Waldfried et al**, Abstract].

Furthermore, **Mandal** discloses pore-forming compounds such as 2,4,6-trisilaoxane or cyclo-1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene, and not pore-forming compounds comprising one or more of a hydrocarbon compound, a decomposable polymer or a polyoxyalkene. **Lin et al** disclose a mixture for depositing an organosilicate film with a dielectric constant lower than 3 [see paragraph 0005], which is formed by the inclusion of a pore-former precursor, or poragen, wherein the poragen may be a decomposable polymer, specifically wherein the decomposable polymer is decomposed by radiation, as further limited by claim 39 [see col. 3, lines 54-57]. It would have been obvious to one of ordinary skill in the art at the time of invention to use the poragen disclosed by **Lin et al** in the mixture of **Mandal** because **Lin et al** discloses that decomposable polymers beneficially may be extracted without severely degrading the pattern fidelity [see col. 3, lines 63-66].

Regarding claims 44-47, the prior art of **Mandal, Waldfried et al** and **Lin et al** disclose the mixture of claim 39 as described above. Furthermore, **Lin et al** disclose wherein the decomposable polymer is a block copolymer [see col. 20, lines 3-6], specifically copolymers or star-shaped polymers, or dendrimeric polymers [see col. 3, lines 58-63].

Response to Arguments

6. Applicant's arguments with respect to claims 30 and 31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colleen E. Rodgers whose telephone number is (571) 272-8603. The examiner can normally be reached on Monday through Friday, 9:00 AM to 6:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CER


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